Measuring Overall Craft Effectiveness (OCE) with Reliable Data

By Ralph W. "Pete" Peters - February 2015

Introduction: Without effective and reliable planning and scheduling plus other best practices, wrench time (tool time) has typically been within 30% to 40% range. Wrench time can often increase from 30% to 60% and higher. The example below shows the gained value of a 20 person staff at 30% wrench time going to a 60% wrench time level. As you will see below **this doubles the equivalent staff** that is doing pure wrench time work. This article outlines the 3 key elements of OCE and how, if we use today's technology, we can collect reliable data for more than just wrench time.

Craft Labor Productivity: Overall Craft Effectiveness (OCE) is about craft labor productivity. OCE's three components include Craft Utilization (CU) x Craft Performance (CP) x Craft Service Quality. Craft Utilization is ***effectiveness*** and what can be called pure wrench time or tool time. Effective planning/scheduling with the right parts on hand to complete the job without interruption is the key for this factor of OCE. Craft Performance (CP) is more about ***efficiency*** for the total job; comparing planned total time to actual total time.

Reliable Planned Time for Scheduling: Planned total time for the schedule includes travel allowances, miscellaneous allowances, and personal fatigue & delay allowances plus the estimated work content, i.e. wrench time. Last but not least is Craft Service Quality (CSQ) which is the ***quality*** factor of the repair. Was the repair completed with the best possible quality without the need for a call back? Many surveys show that the human factor in one key reason for problems with reliability.

Quality of Repairs: Craft Service Quality is probably the easiest to measure since we expect this number to be low to begin with. Craft Performance is easy as well if we have reliable planning times for jobs and have a reliable means to charge actual craft labor required to the work order. Craft Utilization is much harder to measure especially if you track delays for parts, delays due to emergency work, and travel time.

However there is an easy way to track Craft Utilization and wrench time. When we improve Craft Utilization via effective planning/scheduling, PM/PdM/CBM and good parts support there can be gained value from one planner position to equal at least five additional crafts people on wrench time. The example below illustrates a net gain of 6 equivalent crafts on wrench time when going from a 30% to 60% level of Craft Utilization.

30% CU= .30 x 20 Existing Crafts People = 6 Equivalent Crafts on Wrench Time	**Net Gain**
60% CU= .60 x 20 Existing Crafts People = 12 Equivalent Crafts on Wrench Time	**6**
Gained Value: 6 positions x $18/Hr. x 40 Hrs/Wk x 52 Wks/Yr =	**$224,640**

Today's technology for bar coding that has been around for a long time now. Bar coding can support asset tagging and identification, parts identification, as well as to the work order itself. A part charged to a work order that has a bar can be a fast and accurate transaction. But one challenge is linking a work order to an asset or a sub-component of an asset. Often we see companies that have not finished the task of numbering all of their physical assets especially those where measuring or improving reliability is beneficial. Correct asset numbering benefits everyone so the planner must make sure that asset numbering is complete.

Establish Complete Asset Numbering: One way to get complete asset numbering is to do it "correctly the second time" using bar code tagging. During this second time numbering activity many important things can occur.

1. Existing asset numbers can be confirmed. Many times migration of data to a new CMMS is done hastily and not really validated nor completed.
2. Missing asset numbers can be established. Missing data from an old system stays missing upon data migration unless it is validated.
3. Parent child relationships can be reviewed. For example, one rule of thumb is that if a critical subsystem or component has a need for reliability improvement and its related failure data needed for analysis, then it should have an asset number.
4. A complete review of asset numbers to correct #1 to #3 above is the ideal time to affix appropriate bar codes to item outside and those inside the confines of the facility.
5. With assets now bar coded along with a bar coded work order we can link the work performed to the asset, a subsystem or a critical component with all be labor and parts charged back to the asset within a work center or department maintenance account number.
6. The next step forward can be hand held devices that can wirelessly receive new work orders, contain complete PM tasks list, collect time to a work order and have clock on and off of a job as required. Prompts can be in place for defining type failure and cause of failures as well.
7. Now with all of the above in place, the once tedious task of using special codes for non wrench time can be eliminated. Since we are most interested in two key

areas of OCE; craft performance and craft utilization (wrench time) they can now be easily accounted for due to bar coding on the asset.

8. **How it Can Work:** The crafts person is assigned a job and "the total job clock starts" let's say at the shop. They then travel to the asset and clock on at the asset to begin their wrench time work (hopefully planned with all items needed for the repair". If they must clock off to get parts they clock off by swiping the bar code again. When they come back, they clock on the job again, finish it and clock off again. They then return to the shop or next job.
9. All of the time clocked on the job is wrench time plus all other non wrench activities such as travel to/from the site, personal fatigue and delays (PF&D) have been allowed for as job allowances for a reliable planning time for scheduling purposes.
10. When the crafts person reviews and provides all required input for the work order they do it and then close the job to maintenance with failure codes, cause of failure and description of repairs. This is before required approvals by supervisors are given and before by a final review by the planner. All of this helps to ensure we get better work order information for asset history and reliability analysis.

Summary: So what does all this application of hand held devices and bar coding give us?

1. First we can have time reporting for pay purposes with simple clock in and clock out at the site entrance or at the maintenance shop.
2. We can better track available hours charged to work orders where the goal can approach 100% charge-back to work centers or specific assets.
3. From the tracking of total planned time accrued to work orders we can get actual time worked, compared to total planned time.
4. Craft Performance (or efficiency) can then be measured across the entire craft workforce not a specific person. For training evaluation purposes a specific person's work could be reviewed for both Craft Performance and Craft Service Quality.
5. By clocking on and clocking off for actual hands on time we are getting a much better picture of wrench time to give a better measure of Craft Utilization (or effectiveness).
6. We are also able to see the impact of emergency work when a person is pulled off and put back on a planned job causing starts and stops and more time required.
7. Scope changes can be readily be analyzed for additional planned times or extremes when planned time is much more than originally planned.

Return-on-Investment: Overall the use of bar coding is not new for some maintenance operations. I have seen some operations that even assigned a hardened laptop for each crafts person. This may have been overkill. Some make use of a smart phone system approach while others use a hand held data collection device. Every service person I have had in my home in the past five years for cable and Internet services uses this approach. The return on investment to enhance craft productivity and reliable data for RCM and RCA can be high when all elements we have discussed are in place. Therefore the economic justification for using new technology is often very easy, especially if an established planning, estimating and scheduling process is in place. **Remember** that gains from both wrench time (Craft Utilization) and Craft Performance together provide significant labor productivity gains and will validate your gained value from a reliable planning, estimating and scheduling process.

Note: Excerpt from **Reliable Maintenance Planning, Estimating and Scheduling (RMPES)**: Chapter 6 - *Why Planners Must Understand Productivity and How RMPES Enhances Total Operations Success.*